



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/738,459	12/17/2003	James M. Tour	11321-P060US	9579

7590 09/29/2005

Ross Spencer Garsson
400 North Ervay Street
P.O. Box 50784
Dallas, TX 75201

EXAMINER

WONG, EDNA

ART UNIT	PAPER NUMBER
----------	--------------

1753

DATE MAILED: 09/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/738,459

Applicant(s)

TOUR ET AL.

Examiner

Edna Wong

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date August 30, 2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

Specification

The disclosure is objected to because of the following informalities:

page 1, line 6, the word "priority" should be amended to the word -- benefit --.

page 3, line 14, the words -- , now US Patent No. 6,899,945 -- should be inserted after "US 2003/0211028 A1)".

page 11, line 25, the word "no" should be amended to the word -- not --.

Appropriate correction is required.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7

line 1, "the crosslinked carbon nanotube material" lacks antecedent basis.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

I. Claims 1-7 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-11 of copending Application No. **10/764,092**. Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter claimed in the instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter, as follows:

(a) irradiating carbon nanotubes with microwaves.

The independent claims of the instant application recite similar limitations, either alone or in combination with their dependent claims, as that of the claims of the copending application wherein the claims of the instant application are encompassed by the claims of the copending application. Therefore, the claims would have been obvious variants over each other.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

II. Claims 1-7 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-28 of copending Application No. **10/738,168**. Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter claimed in the instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter, as follows:

(a) irradiating carbon nanotubes with microwaves.

The independent claims of the instant application recite similar limitations, either alone or in combination with their dependent claims, as that of the claims of the copending application wherein the claims of the instant application are encompassed by the claims of the copending application. Therefore, the claims would have been obvious

variants over each other.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Tsai et al.** ("The Welding of Carbon Nanotubes", *Carbon*, Vol. 38 (2000), pp. 1899-1902) in combination with **Bower et al.** (US Patent Application Publication No. 2002/0114949 A1).

Tsai teaches a method comprising a step of irradiating carbon nanotubes with microwaves (= carbon nanotubes were grown onto a silicon layer using a microwave plasma enhanced chemical vapor deposition (MPE-CVD)) [pages 1900-1901; and Fig. 3].

The method of Tsai differs from the instant invention because Tsai does not disclose the following:

- a. To yield a plurality of crosslinked carbon nanotubes, as recited in claim 1.

Tsai teaches that joining nanotubes grow steadily and then the Pd or Pd-Si alloy nanoparticles would sink into the carbon nanotube and lengthen it into the Pd or Pd-Si alloy nanowires. The welding of nanotubes into Y-junction onto a silicon wafer can be effectively achieved by MPE-CVD with a CH₄/H₂ gas mixture (page 1901; and Fig. 3).

The invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because the growing of the joined nanotubes and/or the welding of the nanotubes into a Y-junction by MPE-CVD are deemed to inherently yield a plurality of crosslinked carbon nanotubes because similar processes can reasonably be expected to yield products which inherently have the same properties. *In re Spada* 15 USPQ 2d 1655 (CAFC 1990); *In re DeBlauwe* 222 USPQ 191; *In re Wiegand* 86 USPQ 155 (CCPA 195).

b. Wherein the step of irradiating is carried out in an inert environment selected from the group consisting of ultra-high vacuum, high vacuum, inert gases, and combinations thereof, as recited in claim 2.

Like Tsai, Bower teaches growing carbon nanotubes by MPECVD. Bower teaches that a MPECVD system contains a vacuum chamber 10 equipped with a microwave source 11 and a heater 12 (page 2, [0022]; and Fig. 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method described by Tsai with wherein the step of irradiating is carried out in an inert environment selected from the group

consisting of ultra-high vacuum, high vacuum, inert gases, and combinations thereof because a MPECVD contains a vacuum chamber as taught by Bower (page 2, [0022]; and Fig. 1). Thus, one having ordinary skill in the art, without undue experimentation, would have readily determined a "high" vacuum.

c. Wherein the microwave radiation comprises a frequency that ranges from about 0.01 GHz to about 100 GHz, as recited in claim 3.

d. Wherein the frequency ranges from about 1 GHz to about 18 GHz, as recited in claim 4.

Like Tsai, Bower teaches growing carbon nanotubes by MPECVD. Bower teaches that a MPECVD system contains a vacuum chamber **10** equipped with a microwave source **11** and a heater **12**. Typical microwave energy frequencies are 2.45 GHz and 915 MHz (page 2, [0022]; and Fig. 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method described by Tsai with wherein the microwave radiation comprises a frequency that ranges from about 0.01 GHz to about 100 GHz and wherein the frequency ranges from about 1 GHz to about 18 GHz because the typical microwave energy frequencies are 2.45 GHz and 915 MHz as taught by Bower (page 2, [0022]; and Fig. 1).

e. Wherein the microwave radiation is generated by a magnetron with a

power that ranges from about 1 W to about 10,000 W, as recited in claim 5.

f. Wherein the power ranges from about 10 W to about 1,000 W, as recited in claim 6.

Like Tsai, Bower teaches growing carbon nanotubes by MPECVD. Bower teaches that a MPECVD system contains a vacuum chamber **10** equipped with a microwave source **11** and a heater **12**. Typical plasma parameters include a microwave power input of 1-5 kW and a gas pressure of 10-100 Torr (page 2, [0022]; and Fig. 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method described by Tsai with wherein the microwave radiation is generated by a magnetron with a power that ranges from about 1 W to about 10,000 W and wherein the power ranges from about 10 W to about 1,000 W because the typical plasma parameters include a microwave power input of 1-5 kW (= 1000-5000 W) as taught by Bower (page 2, [0022]; and Fig. 1).

g. Wherein the crosslinked carbon nanotube material comprises at least one junction formed via the rearrangement of carbon atoms, as recited in claim 7.

Tsai teaches that joining nanotubes grow steadily and then the Pd or Pd-Si alloy nanoparticles would sink into the carbon nanotube and lengthen it into the Pd or Pd-Si alloy nanowires. The welding of nanotubes into Y-junction onto a silicon wafer can be effectively achieved by MPE-CVD with a CH₄/H₂ gas mixture (page 1901; and Fig. 3).

The invention as a whole would have been obvious to one having ordinary skill in

Art Unit: 1753

the art at the time the invention was made because the growing of the joined nanotubes and/or the welding of the nanotubes into a Y-junction by MPE-CVD are deemed to inherently crosslink the carbon nanotube material to comprise at least one junction formed via the rearrangement of carbon atoms because similar processes can reasonably be expected to yield products which inherently have the same properties. *In re Spada* 15 USPQ 2d 1655 (CAFC 1990); *In re DeBlauwe* 222 USPQ 191; *In re Wiegand* 86 USPQ 155 (CCPA 195).

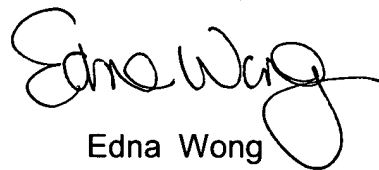
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edna Wong whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number: 10/738,459
Art Unit: 1753

Page 10

A handwritten signature in black ink, appearing to read "Edna Wong". The signature is fluid and cursive, with the first name "Edna" and last name "Wong" clearly distinguishable.

Edna Wong
Primary Examiner
Art Unit 1753

EW
September 23, 2005